

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT:

(A) NAME: NOVO NORDISK
 (B) STREET: Novo Alle
 (C) CITY: Bagsvaerd
 (E) COUNTRY: Denmark
 (F) POSTAL CODE (ZIP): DK-2800
 (G) TELEPHONE: +45 44 44 88 88
 (H) TELEFAX: +45 44 49 05 55

(ii) TITLE OF INVENTION: LACCASE MUTANTS

(iii) NUMBER OF SEQUENCES: 10

(iv) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk
 (B) COMPUTER: IBM PC compatible
 (C) OPERATING SYSTEM: PC-DOS/MS-DOS
 (D) SOFTWARE: PatentIn Release #1.0, Version #1.30 (EPO)

(2) INFORMATION FOR SEQ ID NO: 1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 539 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

Met	Phe	Lys	Asn	Leu	Leu	Ser	Phe	Ala	Leu	Leu	Ala	Ile	Ser	Val	Ala	1	5	10	15
Asn	Ala	Gln	Ile	Val	Asn	Ser	Val	Asp	Thr	Met	Thr	Leu	Thr	Asn	Ala	20	25	30	
Asn	Val	Ser	Pro	Asp	Gly	Phe	Thr	Arg	Ala	Gly	Ile	Leu	Val	Asn	Gly	35	40	45	
Val	His	Gly	Pro	Leu	Ile	Arg	Gly	Gly	Lys	Asn	Asp	Asn	Phe	Glu	Leu	50	55	60	
Asn	Val	Val	Asn	Asp	Leu	Asp	Asn	Pro	Thr	Met	Leu	Arg	Pro	Thr	Ser	65	70	75	80
Ile	His	Trp	His	Gly	Leu	Phe	Gln	Arg	Gly	Thr	Asn	Trp	Ala	Asp	Gly	85	90	95	
Ala	Asp	Gly	Val	Asn	Gln	Cys	Pro	Ile	Ser	Pro	Gly	His	Ala	Phe	Leu	100	105	110	
Tyr	Lys	Phe	Thr	Pro	Ala	Gly	His	Ala	Gly	Thr	Phe	Trp	Tyr	His	Ser	115	120	125	
His	Phe	Gly	Thr	Gln	Tyr	Cys	Asp	Gly	Leu	Arg	Gly	Pro	Met	Val	Ile	130	135	140	
Tyr	Asp	Asp	Asn	Asp	Pro	His	Ala	Ala	Leu	Tyr	Asp	Glu	Asp	Asp	Glu	145	150	155	160
Asn	Thr	Ile	Ile	Thr	Leu	Ala	Asp	Trp	Tyr	His	Ile	Pro	Ala	Pro	Ser				

	165								170				175			
5	Ile	Gln	Gly	Ala	Ala	Gln	Pro	Asp	Ala	Thr	Leu	Ile	Asn	Gly	Lys	Gly
				180					185					190		
	Arg	Tyr	Val	Gly	Gly	Pro	Ala	Ala	Glu	Leu	Ser	Ile	Val	Asn	Val	Glu
			195					200					205			
10	Gln	Gly	Lys	Lys	Tyr	Arg	Met	Arg	Leu	Ile	Ser	Leu	Ser	Cys	Asp	Pro
		210					215					220				
	Asn	Trp	Gln	Phe	Ser	Ile	Asp	Gly	His	Glu	Leu	Thr	Ile	Ile	Glu	Val
	225					230					235					240
15	Asp	Gly	Gln	Leu	Thr	Glu	Pro	His	Thr	Val	Asp	Arg	Leu	Gln	Ile	Phe
					245					250					255	
	Thr	Gly	Gln	Arg	Tyr	Ser	Phe	Val	Leu	Asp	Ala	Asn	Gln	Pro	Val	Asp
				260					265					270		
20	Asn	Tyr	Trp	Ile	Arg	Ala	Gln	Pro	Asn	Lys	Gly	Arg	Asn	Gly	Leu	Ala
			275					280					285			
	Gly	Thr	Phe	Ala	Asn	Gly	Val	Asn	Ser	Ala	Ile	Leu	Arg	Tyr	Ala	Gly
25		290					295					300				
	Ala	Ala	Asn	Ala	Asp	Pro	Thr	Thr	Ser	Ala	Asn	Pro	Asn	Pro	Ala	Gln
	305					310					315					320
30	Leu	Asn	Glu	Ala	Asp	Leu	His	Ala	Leu	Ile	Asp	Pro	Ala	Ala	Pro	Gly
					325					330					335	
	Ile	Pro	Thr	Pro	Gly	Ala	Ala	Asp	Val	Asn	Leu	Arg	Phe	Gln	Leu	Gly
				340					345					350		
35	Phe	Ser	Gly	Gly	Arg	Phe	Thr	Ile	Asn	Gly	Thr	Ala	Tyr	Glu	Ser	Pro
			355					360					365			
	Ser	Val	Pro	Thr	Leu	Leu	Gln	Ile	Met	Ser	Gly	Ala	Gln	Ser	Ala	Asn
40		370					375					380				
	Asp	Leu	Leu	Pro	Ala	Gly	Ser	Val	Tyr	Glu	Leu	Pro	Arg	Asn	Gln	Val
	385					390					395					400
45	Val	Glu	Leu	Val	Val	Pro	Ala	Gly	Val	Leu	Gly	Gly	Pro	His	Pro	Phe
					405					410					415	
	His	Leu	His	Gly	His	Ala	Phe	Ser	Val	Val	Arg	Ser	Ala	Gly	Ser	Ser
				420					425					430		
50	Thr	Tyr	Asn	Phe	Val	Asn	Pro	Val	Lys	Arg	Asp	Val	Val	Ser	Leu	Gly
			435					440					445			
	Val	Thr	Gly	Asp	Glu	Val	Thr	Ile	Arg	Phe	Val	Thr	Asp	Asn	Pro	Gly
55		450					455					460				
	Pro	Trp	Phe	Phe	His	Cys	His	Ile	Glu	Phe	His	Leu	Met	Asn	Gly	Leu
	465					470					475					480
60	Ala	Ile	Val	Phe	Ala	Glu	Asp	Met	Ala	Asn	Thr	Val	Asp	Ala	Asn	Asn
					485					490					495	
	Pro	Pro	Val	Glu	Trp	Ala	Gln	Leu	Cys	Glu	Ile	Tyr	Asp	Asp	Leu	Pro
				500					505					510		
65	Pro	Glu	Ala	Thr	Ser	Ile	Gln	Thr	Val	Val	Arg	Arg	Ala	Glu	Pro	Thr
			515					520					525			

Gly Phe Ser Ala Lys Phe Arg Arg Glu Gly Leu
530 535

5 (2) INFORMATION FOR SEQ ID NO: 2:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 499 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

Gly Ile Gly Pro Val Ala Asp Leu Thr Ile Thr Asn Ala Ala Val Ser
1 5 10 15

Pro Asp Gly Phe Ser Arg Gln Ala Val Val Val Asn Gly Gly Thr Pro
20 25 30

Gly Pro Leu Ile Thr Gly ~~Asn~~ Met Gly Asp Arg Phe Gln Leu Asn Val
35 40 45

Ile Asp Asn Leu Thr Asn His Thr Met Leu Lys Ser Thr Ser Ile His
50 55 60

Trp His Gly Phe Phe Gln Lys Gly Thr Asn Trp Ala Asp Gly Pro Ala
65 70 75 80

Phe Ile Asn Gln Cys Pro Ile Ser Ser Gly His Ser Phe Leu Tyr Asp
85 90 95

Phe Gln Val Pro Asp Gln Ala Gly Thr Phe Trp Tyr His Ser His Leu
100 105 110

Ser Thr Gln Tyr Cys Asp Gly Leu Arg Gly Pro Phe Val Val Tyr Asp
115 120 125

Pro Asn Asp Pro Ala Ala Asp Leu Tyr Asp Val Asp Asn Asp Asp Thr
130 135 140

Val	Ile	Thr	Leu	Val	Asp	Trp	Tyr	His	Val	Ala	Ala	Lys	Leu	Gly	Pro
145					150					155					160

Ala Phe Pro Leu Gly Ala Asp Ala Thr Leu Ile Asn Gly Lys Gly Arg
165 170 175

Ser Pro Ser Thr Thr Thr Ala Asp Leu Ser Val Ile Ser Val Thr Pro
180 185 190

Gly Lys Arg Tyr Arg Phe Arg Leu Val Ser Leu Ser Cys Asp Pro Asn
195 200 205

Tyr Thr Phe Ser Ile Asp Gly His Asn Met Thr Ile Ile Glu Thr Asp
210 215 220

Ser Ile Asn Thr Ala Pro Leu Val Val Asp Ser Ile Gln ~~Ile~~ Phe Ala
225 230 235 240

Ala Gln Arg Tyr Ser Phe Val Leu Glu Ala Asn Gln Ala Val ~~Asp~~ Asn
245 250 255

Tyr Trp Ile Arg Ala Asn Pro Asn Phe Gly Asn Val Gly Phe Thr Gly
260 265 270

120

Gly Ile Asn Ser Ala Ile Leu Arg Tyr Asp Gly Ala Ala Ala Val Glu
 275 280 285
 Pro Thr Thr Thr Gln Thr Thr Ser Thr Ala Pro Leu Asn Glu Val Asn
 290 295 300
 Leu His Pro Leu Val Thr Thr Ala Val Pro Gly Ser Pro Val Ala Gly
 305 310 315 320
 Gly Val Asp Leu Ala Ile Asn Met Ala Phe Asn Phe Asn Gly Thr Asn
 325 330 335
 Phe Phe Ile Asn Gly Ala Ser Phe Thr Pro Pro Thr Val Pro Val Leu
 340 345 350
 Leu Gln Ile Ile Ser Gly Ala Gln Asn Ala Gln Asp Leu Leu Pro Ser
 355 360 365
 Gly Ser Val Tyr Ser Leu Pro Ser Asn Ala Asp Ile Glu Ile Ser Phe
 370 375 380
 Pro Ala Thr Ala Ala Ala Pro Gly Ala Pro His Pro Phe His Leu His
 385 390 395 400
 Gly His Ala Phe Ala Val Val Arg Ser Ala Gly Ser Thr Val Tyr Asn
 405 410 415
 Tyr Asp Asn Pro Ile Phe Arg Asp Val Val Ser Thr Gly Thr Pro Ala
 420 425 430
 Ala Gly Asp Asn Val Thr Ile Arg Phe Arg Thr Asp Asn Pro Gly Pro
 435 440 445
 Trp Phe Leu His Cys His Ile Asp Phe His Leu Glu Ala Gly Phe Ala
 450 455 460
 Val Val Phe Ala Glu Asp Ile Pro Asp Val Ala Ser Ala Asn Pro Val
 465 470 475 480
 Pro Gln Ala Trp Ser Asp Leu Cys Pro Thr Tyr Asp Ala Leu Asp Pro
 485 490 495
 Ser Asp Gln

(2) INFORMATION FOR SEQ ID NO: 3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 499 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 3:

Ala Ile Gly Pro Val Ala Ser Leu Val Val Ala Asn Ala Pro Val Ser
 1 5 10 15
 Pro Asp Gly Phe Leu Arg Asp Ala Ile Val Val Asn Gly Val Val Pro
 20 25 30
 Ser Pro Leu Ile Thr Gly Lys Lys Gly Asp Arg Phe Gln Leu Asn Val
 35 40 45
 Val Asp Thr Leu Thr Asn His Ser Met Leu Lys Ser Thr Ser Ile His

	50		55		60											
	Trp 65	His	Gly	Phe	Phe	Gln 70	Ala	Gly	Thr	Asn	Trp 75	Ala	Glu	Gly	Pro	Ala 80
5	Phe	Val	Asn	Gln	Cys 85	Pro	Ile	Ala	Ser	Gly 90	His	Ser	Phe	Leu	Tyr 95	Asp
	Phe	His	Val	Pro 100	Asp	Gln	Ala	Gly	Thr 105	Phe	Trp	Tyr	His	Ser 110	His	Leu
10	Ser	Thr	Gln 115	Tyr	Cys	Asp	Gly	Leu 120	Arg	Gly	Pro	Phe	Val 125	Val	Tyr	Asp
	Pro	Lys 130	Asp	Pro	His	Ala	Ser 135	Arg	Tyr	Asp	Val	Asp 140	Asn	Glu	Ser	Thr
15	Val 145	Ile	Thr	Leu	Thr	Asp 150	Trp	Tyr	His	Thr	Ala 155	Ala	Arg	Leu	Gly	Pro 160
20	Lys	Phe	Pro	Leu	Gly 165	Ala	Asp	Ala	Thr	Leu 170	Ile	Asn	Gly	Leu	Gly 175	Arg
	Ser	Ala	Ser	Thr 180	Pro	Thr	Ala	Ala	Leu 185	Ala	Val	Ile	Asn	Val 190	Gln	His
25	Gly	Lys	Arg 195	Tyr	Arg	Phe	Arg	Leu 200	Val	Ser	Ile	Ser	Cys 205	Asp	Pro	Asn
	Tyr	Thr 210	Phe	Ser	Ile	Asp	Gly 215	His	Asn	Leu	Thr	Val 220	Ile	Glu	Val	Asp
30	Gly 225	Ile	Asn	Ser	Gln	Pro 230	Leu	Leu	Val	Asp	Ser 235	Ile	Gln	Ile	Phe	Ala 240
35	Ala	Gln	Arg	Tyr	Ser 245	Phe	Val	Leu	Asn	Ala 250	Asn	Gln	Thr	Val	Gly 255	Asn
	Tyr	Trp	Val	Arg 260	Ala	Asn	Pro	Asn	Phe 265	Gly	Thr	Val	Gly	Phe 270	Ala	Gly
40	Gly	Ile	Asn 275	Ser	Ala	Ile	Leu	Arg 280	Tyr	Gln	Gly	Ala	Pro 285	Val	Ala	Glu
	Pro	Thr 290	Thr	Thr	Gln	Thr	Pro 295	Ser	Val	Ile	Pro	Leu 300	Ile	Glu	Thr	Asn
45	Leu 305	His	Pro	Leu	Ala	Arg 310	Met	Pro	Val	Pro	Gly 315	Ser	Pro	Thr	Pro	Gly 320
50	Gly	Val	Asp	Lys	Ala 325	Leu	Asn	Leu	Ala	Phe 330	Asn	Phe	Asn	Gly	Thr 335	Asn
	Phe	Phe	Ile	Asn 340	Asn	Ala	Thr	Phe	Thr 345	Pro	Pro	Thr	Val	Pro 350	Val	Leu
55	Leu	Gln	Ile 355	Leu	Ser	Gly	Ala	Gln 360	Thr	Ala	Gln	Asp	Leu 365	Leu	Pro	Ala
	Gly	Ser 370	Val	Tyr	Pro	Leu	Pro 375	Ala	His	Ser	Thr	Ile 380	Glu	Ile	Thr	Leu
60	Pro	Ala	Thr	Ala	Leu	Ala 390	Pro	Gly	Ala	Pro	His 395	Pro	Phe	His	Leu	His 400
65	Gly	His	Ala	Phe	Ala 405	Val	Val	Arg	Ser	Ala 410	Gly	Ser	Thr	Thr	Tyr	Asn 415

Tyr Asn Asp Pro Ile Phe Arg Asp Val Val Ser Thr Gly Thr Pro Ala
 420 425 430
 5 Ala Gly Asp Asn Val Thr Ile Arg Phe Gln Thr Asp Asn Pro Gly Pro
 435 440 445
 Trp Phe Leu His Cys His Ile Asp Phe His Leu Asp Ala Gly Phe Ala
 450 455 460
 10 Ile Val Phe Ala Glu Asp Val Ala Asp Val Lys Ala Ala Asn Pro Val
 465 470 475 480
 15 Pro Lys Ala Trp Ser Asp Leu Cys Pro Ile Tyr Asp Gly Leu Ser Glu
 485 490 495
 Ala Asn Gln

20 (2) INFORMATION FOR SEQ ID NO: 4:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 548 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 4:

Met His Thr Phe Leu Arg Ser Thr Ala Leu Val Val Ala Gly Leu Ser
 1 5 10 15
 35 Ala Arg Ala Leu Ala Ser Ile Gly Pro Val Thr Asp Phe His Ile Val
 20 25 30
 40 Asn Ala Ala Val Ser Pro Asp Gly Phe Ser Arg Gln Ala Val Leu Ala
 35 40 45
 Glu Gly Val Phe Pro Gly Pro Leu Ile Ala Gly Asn Lys Gly Asp Asn
 50 55 60
 45 Phe Gln Ile Asn Val Ile Asp Glu Leu Thr Asn Ala Thr Met Leu Lys
 65 70 75 80
 Thr Thr Thr Ile His Trp His Gly Phe Phe Gln His Gly Thr Asn Trp
 85 90 95
 50 Ala Asp Gly Pro Ala Phe Ile Asn Gln Cys Pro Ile Ala Ser Gly Asp
 100 105 110
 55 Ser Phe Leu Tyr Asn Phe Gln Val Pro Asp Gln Ala Gly Thr Phe Trp
 115 120 125
 Tyr His Ser His Leu Ser Thr Gln Tyr Cys Asp Gly Leu Arg Gly Pro
 130 135 140
 60 Phe Val Val Tyr Asp Pro Ala Asp Pro Tyr Leu Asp Gln Tyr Asp Val
 145 150 155 160
 Asp Asp Asp Ser Thr Val Ile Thr Leu Ala Asp Trp Tyr His Thr Ala
 165 170 175
 65 Ala Arg Leu Gly Ser Pro Phe Pro Ala Ala Asp Thr Thr Leu Ile Asn
 180 185 190

Gly Leu Gly Arg Cys Gly Glu Ala Gly Cys Pro Val Ser Asp Leu Ala
 195 200 205
 5 Val Ile Ser Val Thr Lys Gly Lys Arg Tyr Arg Phe Arg Leu Val Ser
 210 215 220
 Ile Ser Cys Asp Ser Phe Phe Thr Phe Ser Ile Asp Gly His Ser Leu
 225 230 235 240
 10 Asn Val Ile Glu Val Asp Ala Thr Asn His Gln Pro Leu Thr Val Asp
 245 250 255
 Glu Leu Thr Ile Tyr Ala Gly Gln Arg Tyr Ser Phe Ile Leu Thr Ala
 260 265 270
 15 Asp Gln Asp Val Asp Asn Tyr Trp Ile Arg Ala Asn Pro Gly Ile Gly
 275 280 285
 20 Ile Thr Thr Gly Phe Ala Gly Gly Ile Asn Ser Ala Ile Leu Arg Tyr
 290 295 300
 Asp Gly Ala Asp Val Val Glu Pro Thr Thr Thr Gln Ala Thr Ser Pro
 305 310 315 320
 25 Val Val Leu Ser Glu Ser Asn Leu Ala Pro Leu Thr Asn Ala Ala Ala
 325 330 335
 Pro Gly Leu Pro Glu Val Gly Gly Val Asp Leu Ala Leu Asn Phe Asn
 340 345 350
 30 Leu Thr Phe Asp Gly Pro Ser Leu Lys Phe Gln Ile Asn Gly Val Thr
 355 360 365
 Phe Val Pro Pro Thr Val Pro Val Leu Leu Gln Ile Leu Ser Gly Ala
 370 375 380
 35 Gln Ser Ala Ala Asp Leu Leu Pro Ser Gly Ser Val Tyr Ala Leu Pro
 385 390 395 400
 40 Ser Asn Ala Thr Ile Glu Leu Ser Leu Pro Ala Gly Ala Leu Gly Gly
 405 410 415
 Pro His Pro Phe His Leu His Gly His Thr Phe Ser Val Val Arg Pro
 420 425 430
 45 Ala Gly Ser Thr Thr Tyr Asn Tyr Val Asn Pro Val Gln Arg Asp Val
 435 440 445
 50 Val Ser Ile Gly Asn Thr Gly Asp Asn Val Thr Ile Arg Phe Asp Thr
 450 455 460
 Asn Asn Pro Gly Pro Trp Phe Leu His Cys His Ile Asp Trp His Leu
 465 470 475 480
 55 Glu Ala Ala Leu Pro Leu Ser Ser Leu Arg Thr Ser Leu Thr Leu Arg
 485 490 495
 Pro Leu Thr Leu Ser Pro Arg Thr Gly Pro Thr Cys Ala Leu Ser Thr
 500 505 510
 60 Thr Leu Trp Thr His Leu Ile Thr Ser Gly Phe Ala Ser Ile Ile Gln
 515 520 525
 65 Trp Met Met Gly Gly Asn Gly Leu Phe Ala Pro His Ala Leu Ser Phe
 530 535 540
 Leu Gly Ser Gln

545

(2) INFORMATION FOR SEQ ID NO: 5:

5

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 529 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

10

(ii) MOLECULE TYPE: protein

15

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 5:

Met Leu Ser Ser Ile Thr Leu Leu Pro Leu Leu Ala Ala Val Ser Thr
1 5 10 15

20

Pro Ala Phe Ala Ala Val Arg Asn Tyr Lys Phe Asp Ile Lys Asn Val
20 25 30

Asn Val Ala Pro Asp Gly Phe Gln Arg Ser Ile Val Ser Val Asn Gly
35 40 45

25

Leu Val Pro Gly Thr Leu Ile Thr Ala Asn Lys Gly Asp Thr Leu Arg
50 55 60

Ile Asn Val Thr Asn Gln Leu Thr Asp Pro Ser Met Arg Arg Ala Thr
65 70 75 80

30

Thr Ile His Trp His Gly Leu Phe Gln Ala Thr Thr Ala Asp Glu Asp
85 90 95

35

Gly Pro Ala Phe Val Thr Gln Cys Pro Ile Ala Gln Asn Leu Ser Tyr
100 105 110

Thr Tyr Glu Ile Pro Leu Arg Gly Gln Thr Gly Thr Met Trp Tyr His
115 120 125

40

Ala His Leu Ala Ser Gln Tyr Val Asp Gly Leu Arg Gly Pro Leu Val
130 135 140

Ile Tyr Asp Pro Asn Asp Pro His Lys Ser Arg Tyr Asp Val Asp Asp
145 150 155 160

45

Ala Ser Thr Val Val Met Leu Glu Asp Trp Tyr His Thr Pro Ala Pro
165 170 175

50

Val Leu Glu Lys Gln Met Phe Ser Thr Asn Asn Thr Ala Leu Leu Ser
180 185 190

Pro Val Pro Asp Ser Gly Leu Ile Asn Gly Lys Gly Arg Tyr Val Gly
195 200 205

55

Gly Pro Ala Val Pro Arg Ser Val Ile Asn Val Lys Arg Gly Lys Arg
210 215 220

Tyr Arg Leu Arg Val Ile Asn Ala Ser Ala Ile Gly Ser Phe Thr Phe
225 230 235 240

60

Ser Ile Glu Gly His Ser Leu Thr Val Ile Glu Ala Asp Gly Ile Leu
245 250 255

His Gln Pro Leu Ala Val Asp Ser Phe Gln Ile Tyr Ala Gly Gln Arg
260 265 270

65

Tyr Ser Val Ile Val Glu Ala Asn Gln Thr Ala Ala Asn Tyr Trp Ile
275 280 285

Arg Ala Pro Met Thr Val Ala Gly Ala Gly Thr Asn Ala Asn Leu Asp
 290 295 300
 5 Pro Thr Asn Val Phe Ala Val Leu His Tyr Glu Gly Ala Pro Asn Ala
 305 310 315 320
 Glu Pro Thr Thr Glu Gln Gly Ser Ala Ile Gly Thr Ala Leu Val Glu
 325 330 335
 10 Glu Asn Leu His Ala Leu Ile Asn Pro Gly Ala Pro Gly Gly Ser Ala
 340 345 350
 Pro Ala Asp Val Ser Leu Asn Leu Ala Ile Gly Arg Ser Thr Val Asp
 355 360 365
 15 Gly Ile Leu Arg Phe Thr Phe Asn Asn Ile Lys Tyr Glu Ala Pro Ser
 370 375 380
 Leu Pro Thr Leu Leu Lys Ile Leu Ala Asn Asn Ala Ser Asn Asp Ala
 385 390 395 400
 Asp Phe Thr Pro Asn Glu His Thr Ile Val Leu Pro His Asn Lys Val
 405 410 415
 25 Ile Glu Leu Asn Ile Thr Gly Gly Ala Asp His Pro Ile His Leu His
 420 425 430
 Gly His Val Phe Asp Ile Val Lys Ser Leu Gly Gly Thr Pro Asn Tyr
 435 440 445
 30 Val Asn Pro Pro Arg Arg Asp Val Val Arg Val Gly Gly Thr Gly Val
 450 455 460
 Val Leu Arg Phe Lys Thr Asp Asn Pro Gly Pro Trp Phe Val His Cys
 465 470 475 480
 His Ile Asp Trp His Leu Glu Ala Gly Leu Ala Leu Val Phe Ala Glu
 485 490 495
 40 Ala Pro Ser Gln Ile Arg Gln Gly Val Gln Ser Val Gln Pro Asn Asn
 500 505 510
 Ala Trp Asn Gln Leu Cys Pro Lys Tyr Ala Ala Leu Pro Pro Asp Leu
 515 520 525
 45 Gln

50 (2) INFORMATION FOR SEQ ID NO: 6:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 599 amino acids

(B) TYPE: amino acid

55 (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

60 (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 6:

Met Ala Arg Ser Thr Thr Ser Leu Phe Ala Leu Ser Leu Val Ala Ser
 1 5 10 15

65 Ala Phe Ala Arg Val Val Asp Tyr Gly Phe Asp Val Ala Asn Gly Ala
 20 25 30

Val Ala Pro Asp Gly Val Thr Arg Asn Ala Val Leu Val Asn Gly Arg

126

		35		40		45										
	Phe	Pro	Gly	Pro	Leu	Ile	Thr	Ala	Asn	Lys	Gly	Asp	Thr	Leu	Lys	Ile
		50					55					60				
5	Thr	Val	Arg	Asn	Lys	Leu	Ser	Asp	Pro	Thr	Met	Arg	Arg	Ser	Thr	Thr
	65					70					75					80
10	Ile	His	Trp	His	Gly	Leu	Leu	Gln	His	Arg	Thr	Ala	Glu	Glu	Asp	Gly
					85					90					95	
	Pro	Ala	Phe	Val	Thr	Gln	Cys	Pro	Ile	Pro	Pro	Gln	Glu	Ser	Tyr	Thr
				100					105					110		
15	Tyr	Thr	Met	Pro	Leu	Gly	Glu	Gln	Thr	Gly	Thr	Tyr	Trp	Tyr	His	Ser
			115					120					125			
20	His	Leu	Ser	Ser	Gln	Tyr	Val	Asp	Gly	Leu	Arg	Gly	Pro	Ile	Val	Ile
		130					135					140				
	Tyr	Asp	Pro	His	Asp	Pro	Tyr	Arg	Asn	Tyr	Tyr	Asp	Val	Asp	Asp	Glu
	145					150					155					160
25	Arg	Thr	Val	Phe	Thr	Leu	Ala	Asp	Trp	Tyr	His	Thr	Pro	Ser	Glu	Ala
					165					170					175	
	Ile	Ile	Ala	Thr	His	Asp	Val	Leu	Lys	Thr	Ile	Pro	Asp	Ser	Gly	Thr
				180					185					190		
30	Ile	Asn	Gly	Lys	Gly	Lys	Tyr	Asp	Pro	Ala	Ser	Ala	Asn	Thr	Asn	Asn
			195					200					205			
	Thr	Thr	Leu	Glu	Asn	Leu	Tyr	Thr	Leu	Lys	Val	Lys	Arg	Gly	Lys	Arg
		210					215					220				
35	Tyr	Arg	Leu	Arg	Ile	Ile	Asn	Ala	Ser	Ala	Ile	Ala	Ser	Phe	Arg	Phe
	225					230					235					240
40	Gly	Val	Gln	Gly	His	Lys	Cys	Thr	Ile	Ile	Glu	Ala	Asp	Gly	Val	Leu
					245					250					255	
	Thr	Lys	Pro	Ile	Glu	Val	Asp	Ala	Phe	Asp	Ile	Leu	Ala	Gly	Gln	Arg
				260					265					270		
45	Tyr	Ser	Cys	Ile	Leu	Lys	Ala	Asp	Gln	Asp	Pro	Asp	Ser	Tyr	Trp	Ile
			275					280					285			
50	Asn	Ala	Pro	Ile	Thr	Asn	Val	Leu	Asn	Thr	Asn	Val	Gln	Ala	Leu	Leu
		290					295					300				
	Val	Tyr	Glu	Asp	Asp	Lys	Arg	Pro	Thr	His	Tyr	Pro	Trp	Lys	Pro	Phe
	305					310					315					320
55	Leu	Thr	Trp	Lys	Ile	Ser	Asn	Glu	Ile	Ile	Gln	Tyr	Trp	Gln	His	Lys
					325					330					335	
	His	Gly	Ser	His	Gly	His	Lys	Gly	Lys	Gly	His	His	His	Lys	Val	Arg
				340				345						350		
60	Ala	Ile	Gly	Gly	Val	Ser	Gly	Leu	Ser	Ser	Arg	Val	Lys	Ser	Arg	Ala
			355					360					365			
	Ser	Asp	Leu	Ser	Lys	Lys	Ala	Val	Glu	Leu	Ala	Ala	Ala	Leu	Val	Ala
		370					375					380				
65	Gly	Glu	Ala	Glu	Leu	Asp	Lys	Arg	Gln	Asn	Glu	Asp	Asn	Ser	Thr	Ile
	385					390					395					400
	Val	Leu	Asp	Glu	Thr	Lys	Leu	Ile	Pro	Leu	Val	Gln	Pro	Gly	Ala	Pro

	405	410	415
5	Gly Gly Ser Arg Pro Ala Asp Val Val Val Pro Leu Asp Phe Gly Leu 420 425 430		
	Asn Phe Ala Asn Gly Leu Trp Thr Ile Asn Asn Val Ser Tyr Ser Pro 435 440 445		
10	Pro Asp Val Pro Thr Leu Leu Lys Ile Leu Thr Asp Lys Asp Lys Val 450 455 460		
	Asp Ala Ser Asp Phe Thr Ala Asp Glu His Thr Tyr Ile Leu Pro Lys 465 470 475 480		
15	Asn Gln Val Val Glu Leu His Ile Lys Gly Gln Ala Leu Gly Ile Val 485 490 495		
	His Pro Leu His Leu His Gly His Ala Phe Asp Val Val Gln Phe Gly 500 505 510		
20	Asp Asn Ala Pro Asn Tyr Val Asn Pro Pro Arg Arg Asp Val Val Gly 515 520 525		
	Val Thr Asp Ala Gly Val Arg Ile Gln Phe Arg Thr Asp Asn Pro Gly 530 535 540		
25	Pro Trp Phe Leu His Cys His Ile Asp Trp His Leu Glu Glu Gly Phe 545 550 555 560		
	Ala Met Val Phe Ala Glu Ala Pro Glu Asp Ile Lys Lys Gly Ser Gln 565 570 575		
30	Ser Val Lys Pro Asp Gly Gln Trp Lys Lys Leu Cys Glu Lys Tyr Glu 580 585 590		
35	Lys Leu Pro Glu Ala Leu Gln 595		

(2) INFORMATION FOR SEQ ID NO: 7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 572 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 7:

Met	Ala	Arg	Thr	Thr	Phe	Leu	Val	Ser	Val	Ser	Leu	Phe	Val	Ser	Ala
1				5					10					15	
Val	Leu	Ala	Arg	Thr	Val	Glu	Tyr	Asn	Leu	Lys	Ile	Ser	Asn	Gly	Lys
			20					25					30		
Ile	Ala	Pro	Asp	Gly	Val	Glu	Arg	Asp	Ala	Thr	Leu	Val	Asn	Gly	Gly
		35					40					45			
Tyr	Pro	Gly	Pro	Leu	Ile	Phe	Ala	Asn	Lys	Gly	Asp	Thr	Leu	Lys	Val
	50					55					60				
Lys	Val	Gln	Asn	Lys	Leu	Thr	Asn	Pro	Asp	Met	Tyr	Arg	Thr	Thr	Ser
65					70					75					80
Ile	His	Trp	His	Gly	Leu	Leu	Gln	His	Arg	Asn	Ala	Asp	Asp	Asp	Gly
				85					90					95	

	Pro	Ala	Phe	Val	Thr	Gln	Cys	Pro	Ile	Val	Pro	Gln	Ala	Ser	Tyr	Thr
				100					105					110		
5	Tyr	Thr	Met	Pro	Leu	Gly	Asp	Gln	Thr	Gly	Thr	Tyr	Trp	Tyr	His	Ser
			115					120					125			
	His	Leu	Ser	Ser	Gln	Tyr	Val	Asp	Gly	Leu	Arg	Gly	Pro	Leu	Val	Ile
10		130					135					140				
	Tyr	Asp	Pro	Lys	Asp	Pro	His	Arg	Arg	Leu	Tyr	Asp	Ile	Asp	Asp	Glu
	145					150					155					160
	Lys	Thr	Val	Leu	Ile	Ile	Gly	Asp	Trp	Tyr	His	Thr	Ser	Ser	Lys	Ala
15					165					170					175	
	Ile	Leu	Ala	Thr	Gly	Asn	Ile	Thr	Leu	Gln	Gln	Pro	Asp	Ser	Ala	Thr
				180					185					190		
20	Ile	Asn	Gly	Lys	Gly	Arg	Phe	Asp	Pro	Asp	Asn	Thr	Pro	Ala	Asn	Pro
			195					200					205			
	Asn	Thr	Leu	Tyr	Thr	Leu	Lys	Val	Lys	Arg	Gly	Lys	Arg	Tyr	Arg	Leu
25		210					215					220				
	Arg	Val	Ile	Asn	Ser	Ser	Ala	Ile	Ala	Ser	Phe	Arg	Met	Ser	Ile	Gln
	225					230					235					240
	Gly	His	Lys	Met	Thr	Val	Ile	Ala	Ala	Asp	Gly	Val	Ser	Thr	Lys	Pro
30					245					250					255	
	Tyr	Gln	Val	Asp	Ser	Phe	Asp	Ile	Leu	Ala	Gly	Gln	Arg	Ile	Asp	Ala
				260					265					270		
35	Val	Val	Glu	Ala	Asn	Gln	Glu	Pro	Asp	Thr	Tyr	Trp	Ile	Asn	Ala	Pro
			275					280					285			
	Leu	Thr	Asn	Val	Ala	Asn	Lys	Thr	Ala	Gln	Ala	Leu	Leu	Ile	Tyr	Glu
40		290					295					300				
	Asp	Asp	Arg	Arg	Pro	Tyr	His	Pro	Pro	Lys	Gly	Pro	Tyr	Arg	Lys	Trp
	305					310					315					320
	Ser	Val	Ser	Glu	Ala	Ile	Ile	Lys	Tyr	Trp	Lys	His	Lys	His	Gly	Arg
45					325					330					335	
	Gly	Leu	Leu	Ser	Gly	His	Gly	Gly	Leu	Lys	Ala	Arg	Met	Met	Glu	Gly
				340					345					350		
50	Ser	Leu	His	Leu	His	Gly	Arg	Arg	Asp	Ile	Val	Lys	Arg	Gln	Asn	Glu
			355					360					365			
	Thr	Thr	Thr	Val	Val	Met	Asp	Glu	Thr	Lys	Leu	Val	Pro	Leu	Glu	His
55		370					375					380				
	Pro	Gly	Ala	Ala	Cys	Gly	Ser	Lys	Pro	Ala	Asp	Leu	Val	Ile	Asp	Leu
	385					390					395					400
60	Thr	Phe	Gly	Val	Asn	Phe	Thr	Thr	Gly	His	Trp	Met	Ile	Asn	Gly	Ile
					405					410					415	
	Pro	His	Lys	Ser	Pro	Asp	Met	Pro	Thr	Leu	Leu	Lys	Ile	Leu	Thr	Asp
				420					425					430		
65	Thr	Asp	Gly	Val	Thr	Glu	Ser	Asp	Phe	Thr	Gln	Pro	Glu	His	Thr	Ile
			435					440					445			

Ile Leu Pro Lys Asn Lys Cys Val Glu Phe Asn Ile Lys Gly Asn Ser
 450 455 460

5 Gly Leu Gly Ile Val His Pro Ile His Leu His Gly His Thr Phe Asp
 465 470 475 480

Val Val Gln Phe Gly Asn Asn Pro Pro Asn Tyr Val Asn Pro Pro Arg
 485 490 495

10 Arg Asp Val Val Gly Ala Thr Asp Glu Gly Val Arg Phe Gln Phe Lys
 500 505 510

Thr Asp Asn Pro Gly Pro Trp Phe Leu His Cys His Ile Asp Trp His
 515 520 525

15 Leu Glu Glu Gly Phe Ala Met Val Phe Ala Glu Ala Pro Glu Ala Ile
 530 535 540

20 Lys Gly Gly Pro Lys Ser Val Pro Val Asp Arg Gln Trp Lys Asp Leu
 545 550 555 560

Cys Arg Lys Tyr Gly Ser Leu Pro Ala Gly Phe Leu
 565 570

(2) INFORMATION FOR SEQ ID NO: 8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 575 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 8:

Met Ala Arg Thr Thr Phe Leu Val Ser Val Ser Leu Phe Val Ser Ala
 1 5 10 15

Val Leu Ala Arg Thr Val Glu Tyr Gly Leu Lys Ile Ser Asp Gly Glu
 20 25 30

Ile Ala Pro Asp Gly Val Lys Arg Asn Ala Thr Leu Val Asn Gly Gly
 35 40 45

Tyr Pro Gly Pro Leu Ile Phe Ala Asn Lys Gly Asp Thr Leu Lys Val
 50 55 60

Lys Val Gln Asn Lys Leu Thr Asn Pro Glu Met Tyr Arg Thr Thr Ser
 65 70 75 80

Ile His Trp His Gly Leu Leu Gln His Arg Asn Ala Asp Asp Asp Gly
 85 90 95

Pro Ser Phe Val Thr Gln Cys Pro Ile Val Pro Arg Glu Ser Tyr Thr
 100 105 110

Tyr Thr Ile Pro Leu Asp Asp Gln Thr Gly Thr Tyr Trp Tyr His Ser
 115 120 125

His Leu Ser Ser Gln Tyr Val Asp Gly Leu Arg Gly Pro Leu Val Ile
 130 135 140

65 Tyr Pro Lys Asp Pro His Arg Arg Leu Tyr Asp Val Asp Asp Glu Lys
 145 150 155 160

Thr Val Leu Ile Ile Gly Asp Trp Tyr His Glu Ser Ser Lys Ala Ile

				165					170					175			
5	Leu	Ala	Ser	Gly 180	Asn	Ile	Thr	Arg	Gln 185	Arg	Pro	Val	Ser	Ala 190	Thr	Ile	
	Asn	Gly	Lys 195	Gly	Arg	Phe	Asp	Pro 200	Asp	Asn	Thr	Pro	Ala 205	Asn	Pro	Asp	
10	Thr	Leu 210	Tyr	Thr	Leu	Lys	Val 215	Lys	Arg	Gly	Lys	Arg 220	Tyr	Arg	Leu	Arg	
	Val 225	Ile	Asn	Ser	Ser	Glu 230	Ile	Ala	Ser	Phe	Arg 235	Phe	Ser	Val	Glu	Gly 240	
15	His	Lys	Val	Thr	Val 245	Ile	Ala	Ala	Asp	Gly 250	Val	Ser	Thr	Lys	Pro 255	Tyr	
	Gln	Val	Asp	Ala 260	Phe	Asp	Ile	Leu	Ala 265	Gly	Gln	Arg	Ile	Asp 270	Cys	Val	
20	Val	Glu 275	Ala	Asn	Gln	Glu	Pro	Asp 280	Thr	Tyr	Trp	Ile	Asn 285	Ala	Pro	Leu	
	Thr	Asn 290	Val	Pro	Asn	Lys	Thr 295	Ala	Gln	Ala	Leu	Leu 300	Val	Tyr	Glu	Glu	
25	Asp 305	Arg	Arg	Pro	Tyr	His 310	Pro	Pro	Lys	Gly	Pro 315	Tyr	Arg	Lys	Trp	Ser 320	
30	Val	Ser	Glu	Ala	Ile 325	Ile	Lys	Tyr	Trp	Asn 330	His	Lys	His	Lys	His 335	Gly	
	Arg	Gly	Leu	Leu 340	Ser	Gly	His	Gly 345	Leu	Lys	Ala	Arg	Met 350	Ile	Glu		
35	Gly	Ser	His 355	His	Leu	His	Ser	Arg 360	Ser	Val	Val	Lys	Arg 365	Gln	Asn	Glu	
40	Thr	Thr 370	Thr	Val	Val	Met	Asp 375	Glu	Ser	Lys	Leu	Val 380	Pro	Leu	Glu	Tyr	
	Pro	Gly	Ala	Ala	Cys	Gly 390	Ser	Lys	Pro	Ala	Asp 395	Leu	Val	Leu	Asp	Leu 400	
45	Thr	Phe	Gly	Leu	Asn 405	Phe	Ala	Thr	Gly	His 410	Trp	Met	Ile	Asn	Gly 415	Ile	
	Pro	Tyr	Glu	Ser	Pro	Lys	Ile	Pro	Thr 425	Leu	Leu	Lys	Ile	Leu	Thr	Asp	
50	Glu	Asp	Gly 435	Val	Thr	Glu	Ser	Asp 440	Phe	Thr	Lys	Glu 445	Glu	His	Thr	Val	
55	Ile 450	Leu	Pro	Lys	Asn	Lys	Cys 455	Ile	Glu	Phe	Asn	Ile 460	Lys	Gly	Asn	Ser	
	Gly 465	Ile	Pro	Ile	Thr	His 470	Pro	Val	His	Leu	His 475	Gly	His	Thr	Trp	Asp 480	
60	Val	Val	Gln	Phe	Gly 485	Asn	Asn	Pro	Pro	Asn 490	Tyr	Val	Asn	Pro	Pro	Arg 495	
65	Arg	Asp	Val	Val	Gly 500	Ser	Thr	Asp	Ala 505	Gly	Val	Arg	Ile 510	Gln	Phe	Lys	
	Thr	Asp	Asn 515	Pro	Gly	Pro	Trp	Phe 520	Leu	His	Cys	His	Ile 525	Asp	Trp	His	

Leu Glu Glu Gly Phe Ala Met Val Phe Ala Glu Ala Pro Glu Ala Val
530 535 540

5 Lys Gly Gly Pro Lys Ser Val Ala Val Asp Ser Gln Trp Glu Gly Leu
545 550 555 560

Cys Gly Lys Tyr Asp Asn Trp Leu Lys Ser Asn Pro Gly Gln Leu
565 570 575

(2) INFORMATION FOR SEQ ID NO: 9:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 616 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 9:

Met Lys Arg Phe Phe Ile Asn Ser Leu Leu Leu Leu Ala Gly Leu Leu
1 5 10 15

Asn Ser Gly Ala Leu Ala Ala Pro Ser Thr His Pro Arg Ser Asn Pro
20 25 30

Asp Ile Leu Leu Glu Arg Asp Asp His Ser Leu Thr Ser Arg Gln Gly
35 40 45

Ser Cys His Ser Pro Ser Asn Arg Ala Cys Trp Cys Ser Gly Phe Asp
50 55 60

Ile Asn Thr Asp Tyr Glu Thr Lys Thr Pro Asn Thr Gly Val Val Arg
65 70 75 80

Arg Tyr Thr Phe Asp Ile Thr Glu Val Asp Asn Arg Pro Gly Pro Asp
85 90 95

Gly Val Ile Lys Glu Lys Leu Met Leu Ile Asn Asp Lys Leu Leu Gly
100 105 110

Pro Thr Val Phe Ala Asn Trp Gly Asp Thr Ile Glu Val Thr Val Asn
115 120 125

Asn His Leu Arg Thr Asn Gly Thr Ser Ile His Trp His Gly Leu His
130 135 140

Gln Lys Gly Thr Asn Tyr His Asp Gly Ala Asn Gly Val Thr Glu Cys
145 150 155 160

Pro Ile Pro Pro Gly Gly Ser Arg Val Tyr Ser Phe Arg Ala Arg Gln
165 170 175

Tyr Gly Thr Ser Trp Tyr His Ser His Phe Ser Ala Gln Tyr Gly Asn
180 185 190

Gly Val Ser Gly Ala Ile Gln Ile Asn Gly Pro Ala Ser Leu Pro Tyr
195 200 205

Asp Ile Asp Leu Gly Val Leu Pro Leu Xaa Asp Trp Tyr Tyr Lys Ser
210 215 220

Ala Asp Gln Leu Val Ile Glu Thr Leu Xaa Lys Gly Asn Ala Pro Phe
225 230 235 240

	Ser	Asp	Asn	Val	Leu	Ile	Asn	Gly	Thr	Ala	Lys	His	Pro	Thr	Thr	Gly
					245					250					255	
5	Glu	Gly	Glu	Tyr	Ala	Ile	Val	Lys	Leu	Thr	Pro	Asp	Lys	Arg	His	Arg
				260					265					270		
	Leu	Arg	Leu	Ile	Asn	Met	Ser	Val	Glu	Asn	His	Phe	Gln	Val	Ser	Leu
			275					280					285			
10	Ala	Lys	His	Thr	Met	Thr	Val	Ile	Ala	Ala	Asp	Met	Val	Pro	Val	Asn
		290					295					300				
	Ala	Met	Thr	Val	Asp	Ser	Leu	Phe	Met	Ala	Val	Gly	Gln	Arg	Tyr	Asp
	305					310					315					320
15	Val	Thr	Ile	Asp	Ala	Ser	Gln	Ala	Val	Gly	Asn	Tyr	Trp	Phe	Asn	Ile
					325					330					335	
	Thr	Phe	Gly	Gly	Gln	Gln	Lys	Cys	Gly	Phe	Ser	His	Asn	Pro	Ala	Pro
20				340					345					350		
	Ala	Ala	Ile	Phe	Arg	Tyr	Glu	Gly	Ala	Pro	Asp	Ala	Leu	Pro	Thr	Asp
			355					360					365			
25	Pro	Gly	Ala	Ala	Pro	Lys	Asp	His	Gln	Cys	Leu	Asp	Thr	Leu	Asp	Leu
		370					375					380				
	Ser	Pro	Val	Val	Gln	Lys	Asn	Val	Pro	Val	Asp	Gly	Phe	Val	Lys	Glu
	385					390					395					400
30	Pro	Gly	Asn	Thr	Leu	Pro	Val	Thr	Leu	His	Val	Asp	Gln	Ala	Ala	Ala
					405					410					415	
	Pro	His	Val	Phe	Thr	Trp	Lys	Ile	Asn	Gly	Ser	Ala	Ala	Asp	Val	Asp
35				420					425					430		
	Trp	Asp	Arg	Pro	Val	Leu	Glu	Tyr	Val	Met	Asn	Asn	Asp	Leu	Ser	Ser
			435					440					445			
40	Ile	Pro	Val	Lys	Asn	Asn	Ile	Val	Arg	Val	Asp	Gly	Val	Asn	Glu	Trp
		450					455					460				
	Thr	Tyr	Trp	Leu	Val	Glu	Asn	Asp	Pro	Glu	Gly	Arg	Leu	Ser	Leu	Pro
	465					470					475					480
45	His	Pro	Met	His	Leu	His	Gly	His	Asp	Phe	Phe	Val	Leu	Gly	Arg	Ser
					485					490					495	
	Pro	Asp	Val	Ser	Pro	Asp	Ser	Glu	Thr	Arg	Phe	Val	Phe	Asp	Pro	Ala
50				500					505					510		
	Val	Asp	Leu	Pro	Arg	Leu	Arg	Gly	His	Asn	Pro	Val	Arg	Arg	Asp	Val
			515					520					525			
55	Thr	Met	Leu	Pro	Ala	Arg	Gly	Trp	Leu	Leu	Leu	Ala	Phe	Arg	Thr	Asp
		530					535					540				
	Asn	Pro	Gly	Ala	Trp	Leu	Phe	His	Cys	His	Ile	Ala	Xaa	His	Val	Ser
60		545				550					555					560
	Gly	Gly	Leu	Ser	Val	Asp	Phe	Leu	Glu	Arg	Pro	Asp	Glu	Leu	Arg	Gly
					565					570					575	
65	Gln	Leu	Thr	Gly	Glu	Ser	Lys	Ala	Glu	Leu	Glu	Arg	Val	Cys	Arg	Glu
				580					585					590		
	Trp	Lys	Asp	Trp	Glu	Ala	Lys	Ser	Pro	His	Gly	Lys	Ile	Asp	Ser	Gly

595

600

605

Leu Lys Gln Arg Arg Trp Asp Ala
610 615

5

(2) INFORMATION FOR SEQ ID NO: 10:

(i) SEQUENCE CHARACTERISTICS:

10

(A) LENGTH: 573 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

15

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 10:

20

Gln Gln Ser Cys Asn Thr Pro Ser Asn Arg Ala Cys Trp Thr Asp Gly
1 5 10 15

Tyr Asp Ile Asn Thr Asp Tyr Glu Val Asp Ser Pro Asp Thr Gly Val
20 25 30

25

Val Arg Pro Tyr Thr Leu Thr Leu Thr Glu Val Asp Asn Trp Thr Gly
35 40 45

30

Pro Asp Gly Val Val Lys Glu Lys Val Met Leu Val Asn Asn Ser Ile
50 55 60

Ile Gly Pro Thr Ile Phe Ala Asp Trp Gly Asp Thr Ile Gln Val Thr
65 70 75 80

35

Val Ile Asn Asn Leu Glu Thr Asn Gly Thr Ser Ile His Trp His Gly
85 90 95

Leu His Gln Lys Gly Thr Asn Leu His Asp Gly Ala Asn Gly Ile Thr
100 105 110

40

Glu Cys Pro Ile Pro Pro Lys Gly Gly Arg Lys Val Tyr Arg Phe Lys
115 120 125

Ala Gln Gln Tyr Gly Thr Ser Trp Tyr His Ser His Phe Ser Ala Gln
130 135 140

45

Tyr Gly Asn Gly Val Val Gly Ala Ile Gln Ile Asn Gly Pro Ala Ser
145 150 155 160

50

Leu Pro Tyr Asp Thr Asp Leu Gly Val Phe Pro Ile Ser Asp Tyr Tyr
165 170 175

Tyr Ser Ser Ala Asp Glu Leu Val Glu Leu Thr Lys Asn Ser Gly Ala
180 185 190

55

Pro Phe Ser Asp Asn Val Leu Phe Asn Gly Thr Ala Lys His Pro Glu
195 200 205

Thr Gly Glu Gly Glu Tyr Ala Asn Val Thr Leu Thr Pro Gly Arg Arg
210 215 220

60

His Arg Leu Arg Leu Ile Asn Thr Ser Val Glu Asn His Phe Gln Val
225 230 235 240

65

Ser Leu Val Asn His Thr Met Cys Ile Ile Ala Ala Asp Met Val Pro
245 250 255

Val Asn Ala Met Thr Val Asp Ser Leu Phe Leu Gly Val Gly Gln Arg
260 265 270

	Tyr	Asp	Val	Val	Ile	Glu	Ala	Asn	Arg	Thr	Pro	Gly	Asn	Tyr	Trp	Phe
			275					280					285			
5	Asn	Val	Thr	Phe	Gly	Gly	Gly	Leu	Leu	Cys	Gly	Gly	Ser	Arg	Asn	Pro
		290					295					300				
	Tyr	Pro	Ala	Ala	Ile	Phe	His	Tyr	Ala	Gly	Ala	Pro	Gly	Gly	Pro	Pro
	305					310					315					320
10	Thr	Asp	Glu	Gly	Lys	Ala	Pro	Val	Asp	His	Asn	Cys	Leu	Asp	Leu	Pro
					325					330					335	
	Asn	Leu	Lys	Pro	Val	Val	Ala	Arg	Asp	Val	Pro	Leu	Ser	Gly	Phe	Ala
15				340					345					350		
	Lys	Arg	Ala	Asp	Asn	Thr	Leu	Asp	Val	Thr	Leu	Asp	Thr	Thr	Gly	Thr
			355					360					365			
20	Pro	Leu	Phe	Val	Trp	Lys	Val	Asn	Gly	Ser	Ala	Ile	Asn	Ile	Asp	Trp
		370					375					380				
	Gly	Arg	Ala	Val	Val	Asp	Tyr	Val	Leu	Thr	Gln	Asn	Thr	Ser	Phe	Pro
25						390					395					400
	Pro	Gly	Tyr	Asn	Ile	Val	Glu	Val	Asn	Gly	Ala	Asp	Gln	Trp	Ser	Tyr
					405					410					415	
	Trp	Leu	Ile	Glu	Asn	Asp	Pro	Gly	Ala	Pro	Phe	Thr	Leu	Pro	His	Pro
30				420					425					430		
	Met	His	Leu	His	Gly	His	Asp	Phe	Tyr	Val	Leu	Gly	Arg	Ser	Pro	Asp
			435					440					445			
35	Glu	Ser	Pro	Ala	Ser	Asn	Glu	Arg	His	Val	Phe	Asp	Pro	Ala	Arg	Asp
		450					455					460				
	Ala	Gly	Leu	Leu	Ser	Gly	Ala	Asn	Pro	Val	Arg	Arg	Asp	Val	Ser	Met
40						470					475					480
	Leu	Pro	Ala	Phe	Gly	Trp	Val	Val	Leu	Ser	Phe	Arg	Ala	Asp	Asn	Pro
					485					490					495	
	Gly	Ala	Trp	Leu	Phe	His	Cys	His	Ile	Ala	Trp	His	Val	Ser	Gly	Gly
45				500					505					510		
	Leu	Gly	Val	Val	Tyr	Leu	Glu	Arg	Ala	Asp	Asp	Leu	Arg	Gly	Ala	Val
			515					520					525			
50	Ser	Asp	Ala	Asp	Ala	Asp	Asp	Leu	Asp	Arg	Leu	Cys	Ala	Asp	Trp	Arg
		530					535					540				
	Arg	Tyr	Trp	Pro	Thr	Asn	Pro	Tyr	Pro	Lys	Ser	Asp	Ser	Gly	Leu	Lys
55		545				550					555					560
	His	Arg	Trp	Val	Glu	Glu	Gly	Glu	Trp	Leu	Val	Lys	Ala			
					565					570						